



A Game theoretic approach to improve compliance to sulphur regulations

Zis, Thalís

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Abstract

The purpose of this paper is to develop a game theoretic modelling framework that improves the effectiveness of sulphur regulations enforcement. The existing legislative framework poses several challenges, stemming (mainly) from a highly non-homogeneous and spatially differentiated system, with cases where the penalty fines are as low as the benefit that the violator enjoyed from not complying. This paper presents the status quo of enforcement in different countries, where the regulation applies, and develops a game theoretic approach for a uniform violation fine system. A mixed strategy game with two players is proposed, representing the ship operator (who can choose to comply or not comply to the regulation), and an enforcement agency (that can opt to inspect or not inspect the ship) respectively. The equilibrium results in an improved penalty system (for both violators and enforcing agencies). Such a system can ensure a level playing field for ship operators that currently have invested heavily in an abatement of options to comply with the sulphur regulations, by promoting good practices among ship operators, while at the same time improve compliance rates and maximize societal environmental benefits. A discussion on the implications of the global sulphur cap of 2020 is concluding the paper, and recommendations for transferability of this framework to other regulations are provided.

Keywords

- Maritime applications
- Logistics
- Game Theory